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FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEY and WATER SUPPLY FORECASTS for ARIZONA

UNITED STATES DEPARTMENT of AGRICULTURE SOIL CONSERVATION SERVICE

Data included in this report were obtained by the agency named above in cooperation with the Federal, State and private organizations listed on the last page of this report. JAN. 15, 1958

UNITED STATES DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE

TO RECIPIENTS OF COOPERATIVE SNOW SURVEY AND WATER SUPPLY FORECAST REPORTS:

The climate of the cultivated and populated areas of the West is characterized by relatively dry summer months. Such precipitation as occurs falls mostly in the winter and early spring months when it is of little immediate benefit to growing crops. Fortunately, most of this precipitation falls as mountain snow which stays on the ground for months, melting later to sustain streamflow during the period of greatest demand during late spring and summer. Thus, nature provides in mountain snow an imposing water storage facility.

The amount of water stored in mountain snow varies from place to place as well as from year to year and accordingly, so does the runoff of the streams. The best seasonal management of variable western water supplies results from fore-knowledge of the runoff.

A snow survey consists of a series of about ten samples taken with specially designed snow sampling equipment along a permanently marked line, about 1000 feet in length, called a snow course. The use of snow sampling equipment provides snow depth and water equivalent values for each sampling point. The average of these values is reported as the snow survey measurement for a snow course.

Snow surveys are made monthly or semi-monthly beginning in January or February and continue through the snow season until April, May or June. Currently more than 1300 western snow courses are measured each year. These measurements furnish the key data for water supply forecasts.

By relating snow survey measurements taken over a period of years to spring-summer runoff during the same period, relationships have been developed which make it possible to forecast seasonal runoff several months in advance of occurrence. In order to make a forecast, once a forecast relationship has been developed, the maximum snow water content at previously selected key snow courses is usually entered in the forecast relationship. More accurate forecasts are often obtained when other factors such as soil moisture, base flow and spring precipitation are considered and included in the forecast relationships.

Listed below are the Federal-State-Private Cooperative Snow Survey and Water Supply Forecast reports available for the West which contain detailed information on snow survey measurements, streamflow forecasts, reservoir storage, soil moisture and other guide data to water management and conservation decisions.

PUBLISHED BY SOIL CONSERVATION SERVICE

REPORTS	ISSUED	COOPERATING WITH	LOCATION
RIVER BASINS			
Coloradd, Rio Grande	MONTHLY (FEBMAY),	CDLO, EXP. STATION	FT. Collins, Cold.
CDLUMBIA Includes Alaska	MONTHLY (JANMAY)	•••••	BDISE, IDAHD
UPPER MISSOURI	MDNTHLY (FEBMAY)	MDNT.AGR.EXP.STATION	BDZEMAN, MDNTANA
WEST-WIDE	SEMI-ANNUALLY(OCT, 1 AND APR,1)	CDDPERATORS	PORTLAND, OREGON
STATES			
ARIZDNA	SEMI-MONTHLY(JAN. 15-APR.1)	SALT R. VALLEY WATER	PHDENIX, ARIZDNA
NE VADA	MONTHLY (FEB APR.)	NEVADA STATE ENGINEER	RENO. NEVADA
OREGDN	MONTHLY (JANMAY)	ORE.AGR.EXP.STATION	PORTLAND, OREGON
UTAH	MDNTHLY (JANMAY)	UTAH STATE ENGINEERUTAH AGR.Exp.STATION	SALT LAKE CITY, UTAH
WASHINGTON	MDNTHLY (FEBMAY)	WASH. STATE DEPT. OFCONSERVATION AND DEVELOPMENT	SPOKANE, WASHINGTON
WYDMING	MDNTHLY (FEBJUNE)	WYOMING STATE ENGINEER	CASPER, WYOMING
Copies of the	various reports may be s	ecured from: Head, Water Sup	ply Forecasting Section

PUBLISHED BY OTHER AGENCIES

Soil Conservation Service

209 S.W. 5th Avenue, Portland 4, Oregon

OTHER SNOW SURVEY REPORTS	
BRITISH COLUMBIAMDNTHLY	(FEBJUNE)
	AND FDRESTS, PARLIAMENT BLDGS, VICTORIA, B.C.
CAL IFDRNIAMonthly	(FEBMAY)

FEDERAL-STATE COOFERATIVE SNOW SURVEYS AND WATER SUPPLY FORECASTS

for

ARIZONA

(Salt, Verde, Gila and part of Lower Colorado River Basin)

Issued

January 17, 1958

Report Prepared

by

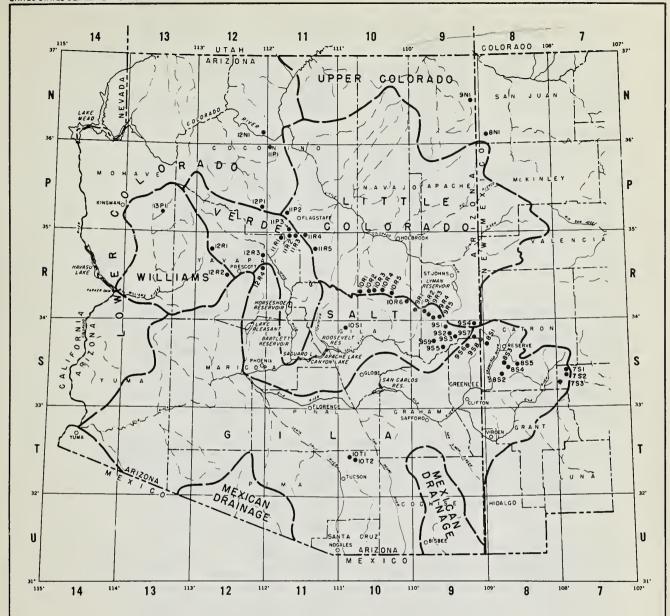
George Watt, Snow Survey Supervisor Soil Conservation Service 807 West Washington Phoenix, Arizona

Issued by

Robert V. Boyle State Conservationist

Victor I. Corbell President Soil Conservation Service Salt River Valley Water Users' Ass'n.

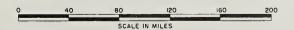
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LEGEND ORAINAGE BASIN BOUNDARY SNOW COURSE

ARIZONA COOPERATIVE SNOW SURVEYS

SNOW COURSES AND DRAINAGE BASINS
JANUARY 1956



INDEX TO SNOW COURSES

NUMBER	* NAME	SEC	TWP	RGE**	ELEVATION	RIVER BASIN
11-P-3	Antelope Park	29	19N	8E	7300	Verde Discontinued
9-5-1	Baldy (p)	28	7N	27E	9000	Salt-Little Colorado
10-T -1	Bear Wallow	6	125	16E	8100	Gila
9-5-6	Beaver Head	13	4N	30E	8000	Salt-Frisco
9-5-3	Big Lake Knoll	2	5N	28 E	8800	Salt-Frisco-Little Colorado Discontinued
7-3-3	big Lake Khoii	2	214	20 [8800	Sair-Frisco-Liffie Colorado Discontinued
7-S-3	Black Canyon	8	135	11W***	6790	Gila
12-N-1	Bright Angel	34	33N	3 E	8400	Lower Colorado
12-R -1	Camp Wood	3	16N	6W	5700	Williams-Verde
10-R -3	Canyon Creek (s)	18	11N	15E	7500	Salt
11-R -2	Casner Park (s)	19	18N	8E	6950	Verde
	22 (0)	•				
12-P-1	Chalender (s)	27	22N	3E	7100	Verde
8 - S-3	Corner Mountain	7_	105	17W***	8850	Gila-Frisco
9-S -9	Corn Creek (p) Lat	.3304	5'N. Lor	109 ⁰ 45 اng	W.§ 7730	Salt
9-S -7	Coronado Trail	26	5N	30E	8000	Salt-Frisco
10-R-2	Elk	31	11 N	14E	7600	Salt-Little Colorado Discontinued
10-R -6	Forest Dale (s)	2	9N	21 E	6000	Salt-Little Colorado
11-P-2	Fort Valley	22	22N	6E	7350	Verde
9 - R -5	Ft. Apache	18	7N	27E	9160	Salt-Little Colorado
8-5-1	Frisco Divide	31	65	20W***	8000	Frisco-Gila
12-R -4	Gaddes Canyon	11	15N	2E	7600	Verde
10-R -5	Gentry	36	11N	15E	7600	Salt-Little Colorado
11-P-1	Grand Canyon	21	30 N	4E	7500	Lower Colorado
11-R-5	Happy Jack	30	17N	9E	7630	Verde
10-R -4	Heber (p)	28	11N	15E	7600	Salt-Little Colorado
7-S-2	Inman	6	115	10W***	7800	Gila
12-R -2	Iron Springs	22	14N	3W	6200	Williams-Verde
9 - S -2	Maverick Fork (s)(p) 13	6N	27E	9050	Salt-Little Colorado
9-R -4	McKay Peak	13	7N	24E	8250	Salt Not read
9-R-2	McNary (s)	14	8.N	23 E	7200	Salt-Little Colorado
9-R -1	Milk Ranch	28	NS	23E	7000	Salt
12-R-3	Mingus Mountain	3	15N	2E	7100	Verde #
	77g					
8 - S-2	Mogollon	2	115	19W***	7000	Frisco-Gila
11-R-4	Mormon Lake	13	18N	8E	7350	Verde #
11-R-3	Mormon Mountain(s	s) 14	18N	8E	7500	Verde
11-R-1	Munds Park (s)	7	18N	7E	6500	Verde
8-5-4	N-Bar Lake	16	105	17W***	8600	Gila
8-S -5	Negrito	6	105	16W***	8200	Gila
9-5-4	Nutrioso	23	6N	30E	8500	Salt-Frisco-Little Colorado
9-5-5				averick, Ar		Salt
9-N-1	Roof Butte	15	.W. 10 11W	6W****	8500	Little Colorado Not read
10-T -2	Rose Canyon	15	125	16E	7300	Gila
10-1 -2	Rose Conyon	13	123	IOL	7300	Gild
9 - 5 -8	State Line	6	65	21W***	8000	Gila-Frisco
7 - S -1	Taylor Creek	20	105	10W***	7850	Gila
9-R -3	Trout Creek	5	7N	24E	6400	Salt Not read
1-11-8	Washington Pass La	t. 35○C	5'N. Lor	ng.108 ^o 50'V	V. § 8600	Little Colorado # Not read
13-P -1	Willow Ranch	16	21 N	WII	5000	Williams
10.0	W 1.6	15	1141	105	7/10	Shareh Cl. 1
10-R-1	Woods Canyon	15	IIN	13E	7640	Salt-Little Colorado Discontinued
10 - S-1	Workman Creek	33	6N	14E	6900	Salt

^{*} Number indicates location of course within coordinate rectangle, thus 9-N 1 is Course *1 in coordinate rectangle 9-N.

^{**} All in Gila and Salt River Base and Meridian except where otherwise indicated.

^{***} New Mexico Principal Meridian.
**** Navajo Base.

On adjacent drainage.

⁽s) Soil Moisture Station installed on or in vicinity of course.

[§] Unsurveyed.

⁽p) Storage gage installed on or in vicinity of course

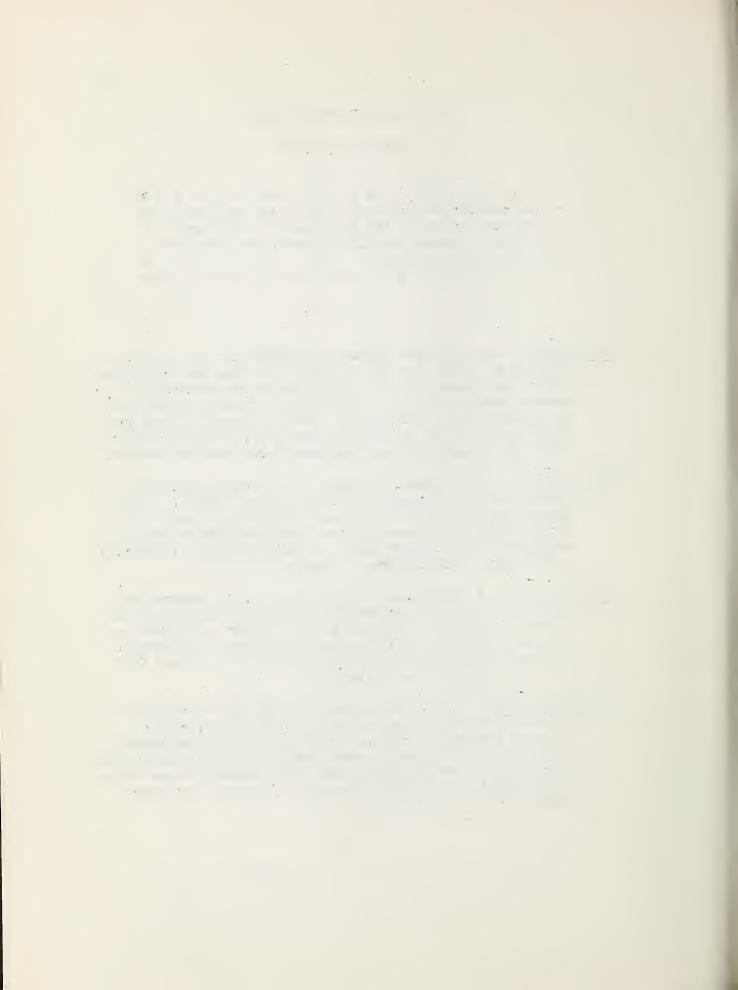
ARIZONA WATER SUPPLY OUTLOOK

January 15, 1958

×	** ** * * * * * * * * * * * * * * * * *	*
×	The outlook for Arizona's 1958 water supplies	*
*	is below average. The snow pack and reservoir	*
*	storage is below normal. However, soil moisture	*
*	conditions are good.	*
يد	24 M N N N N N N N N N N N N N N N N N N	36

- SNOW COVER: The only snow courses reporting snow were those courses at 9,000 feet on the White Mountains and on the North Rim of the Grand Canyon. A light cover was reported on the courses near Nutrioso and Beaverhead Lodge. The snow pack is comparable to last year at this date, when similar snow pack conditions existed. The courses reporting snow were about 90 per cent of last year and 75 per cent of average.
- SOIL MOISTURE: Soil moisture conditions are more favorable.

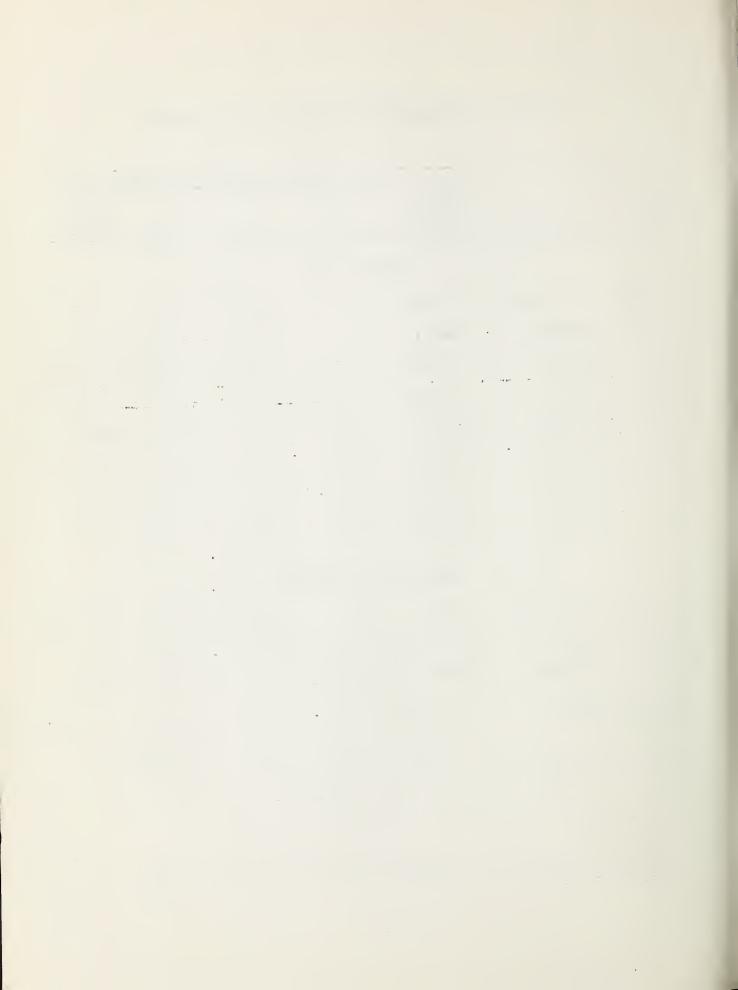
 Summer and fall rains have filled the soil profile in the forest mountains. The soil moisture stations have shown some moisture withdrawal in the first two feet during the relatively dry December and first half of January; however, conditions are still above average.
- PRECIPITATION: A random sample of thirteen U. S. Weather Bureau stations shows the October through December precipitation to be above normal. It also shows December to be much below normal. This early fall precipitation added to the water storage and soil moisture, but most of the snow that fell during this period has melted.
- RESERVOIRED WATER: The water stored in eight major reservoirs in Arizona, excluding those on the Colorado River, showed improved conditions over last year but still below average storage for this time of year. The eight reservoirs on the Gila, Salt, Verde and Agua Fria Rivers showed storage to be 150 per cent of last year, but only 65 per cent of average and 15 per cent of capacity.



STATUS OF ARIZONA RESERVOIR STORAGE - JANUARY 15, 1958

BASIN		USABLE	U	SABLE STORAG	GE 1000	ACRE FEET	
and/or STREAM	RESERVOIR	CAPACITY 1000s AF	1.958	195 7	1956	15-lear Average 1938-52	
GILA DRAINAGE							
Agua Fria	Lake Pleasant	163.8	7.6	11.5	28.0	18.9	
Gila	San Carlos	1,205.0	58.1	6.0	69.0	144.2	
Verde	Bartlett	180.0	104.5	27.2	69.0	38.1 1/	
Verde	Horseshoe	143.0	1.3	36.4	2.9	13.2 1/	
Salt	Roosevelt	1,381.6	53.9	84.6	211.2	397.1	
Salt	Apache	245.1	199.3	82.0	241.8	168.2	
Salt	Canyon	57.8	54.3	53.7	56.6	26.1	
Salt	Saguaro	69.8	50.2	44.7	66.3	16.2	
		LOWER (COLORADO DR	AINAGE			
Colorado	Lake Havasu	688.0	558.9	612,6	597.8	554-5 1/	
Colorado	Lake Mohave	1,810.0	1,542.1	1,572.0	1,554.0	1,380.0 1/	
Colorado	Lake Mead	27,207.0	20,497.0	11,870.0	11,332.0	19,832.0	
Little Colorado	Lyman	30.6		0.0	7.9	7.4 <u>1</u> /	
Little Colorado	Show Low Lake	5.1	0.1	0.1	0.1		

^{1/} Average is for less than 15 years of record in the 1938-52 period.



SUMMARY OF JANUARY 15, 1958 ARIZONA SNOW SURVEYS AND COMPARISON OF DATA WITH THAT OF PREVIOUS YEARS BY WATERSHED

	No. of Snow Courses Depth in 1958		Snow Water Content in Inches				Snow 1958 Water Density Content in 1958 Percent of		
WATERSHED	Average		1958	1957	1956	Normal	Percent		
Gila River	6	- 2	0.4	0.0	0.0	1.5	20		27
Salt River	13	4	0.8	0.8	0.5	2.4	20	100	33
Verde River	9	0	0.0	0.0	0.0	2.0			
Williams River	2	0	0.0	0.0	0.0	1.2			
Lower Colorado River	3	5	1.2	0.9	0.7	4.3	24	133	29
Little Colorado River		3	0.5	0.6	0.3	2.3	17	83	22



			SNOW COVER MEASUREMENTS						
				1958	NOW CON	en rea		ST RECORD	
DRAINAGE BASIN			Date		Vater	Water		nt (In.)	Prior
and			of		Content			1938-52	Yrs. of
SNOW COURSE	No.	Elev.	Survey		(In.)	1957	1956	Average	Record
GILA RIVER								2/	
Nutrioso	984	8500	1/15	3	0.9	0.0	0.0	1.9	18
Bear Wallow 3/	10T1	8100		Delayed	-	0.0	0.0	2.2	10
Frisco Divide 3/	8S1	8000		Delayed		0.0	0.0	1.7	18
State Line 3/	988	8000		Delayed		0.0	0.0	2.2	18
Coronado Trail	957	8000	1/15	4	0.9	0.0	0.0	2.7	18
Beaver Head	986	8000	1/15	2	0.2	0.0		2.7	16
Taylor Creek	7S1	7850	1/15	0	0.0	0.0	0.0	0.7	1 /1
Inman	752	7800	1/15	0	0.0	0.0	0.0	0.6	11
Rose Canyon 3/	10T2	7300		Delayed		0.0	0,0	0.6	10
Mogollon	8S2	7000	1/14	3	0.6	0.0	0.0		5
Black Canyon 3/	7S3	6790	Report	Delayed			0.0		4
SALT RIVER									
Ft. Apache 1/	9R5	2160	1/12	13	2.7	2.8	3.4		7
Baldy 1/	981	9125	1/12	11	2.2	2.7	T	~~~	7
Maverick Fork	952	9020	1/12	13	3.3	4.7	3.7		7
Nutrioso	9S4	8500	1/15	3 4	0.9	0.0	0.0	1.9	18
Coronado Trail	957	8000	1/15	4	0.9	0.0	0.0	2.7	18
Beaver Head	986	8000	1/15	2	0.2	0.0		2.7	16
Pacheta	985	7800	1/14	0	0.0	0.0	0.0		8
Gentry	10R5	7600	1/12	0	0.0	0.0	0.0		6
Heber	10R4	7600	1/12	0	0.0	0.0	0.0		6 0
Canyon Creek #2 3 McNary	9R2	7500 7200	1/12 1/15	0	0.0	0.0	0.0	2.3	17
Milk Ranch	9R1	7000	1/15	0	0.0	0.0	0.0	1.2	16
Workman Creek	1051	6900	1/13	0	0.0	0.0	0.0	*****	6
Forest Dale	10R6	6430	1/15	0	0.0	0.0	0.0	0.8	17
	2010	4 ,50	+/ +/	ŭ	0.0	3,0			_,
VERDE RIVER	2225	5/00	- /- l				0.0		ہ
Happy Jack	11R5	7630	1/14	0	0.0	0.0	0.0		5
Gaddes Canyon 3/	12R4	7600	1/14	T	T	0.0	0.0		4
Mormon Mountain Mormon Lake 1/	11R3 11R4	7500 7350	1/13	0	0.0	T T	0.0	4.0	7 11
Fort Valley 1/3/	11P2	7350	1/13 Report		0.0	0.0	0.0	2,9	11
Mingus Mountain	12R3	7100	1/14	0	0.0	0.0	0.0	1.0	11
Chalender	12P1	7100	1/14	0	0.0	0.0	0.0	3.4	11
Casner Park	11R2	6930	1/13	0	0.0	0.0	0.0		7
Munds Park	11R1	6500	1/13	Ö	0.0	0.0	0.0		6
Iron Springs 1/	12R2	6200	1/14	0	0.0	0.0	0.0	1.3	12
Camp Wood	12R1	5700	1/15	0	0.0	0.0		1.1	11

^{1/} On adjacent drainage.

^{2/} All 1938-52 averages are estimated from existing records within period.

^{3/} Not included in watershed averages.

* ****

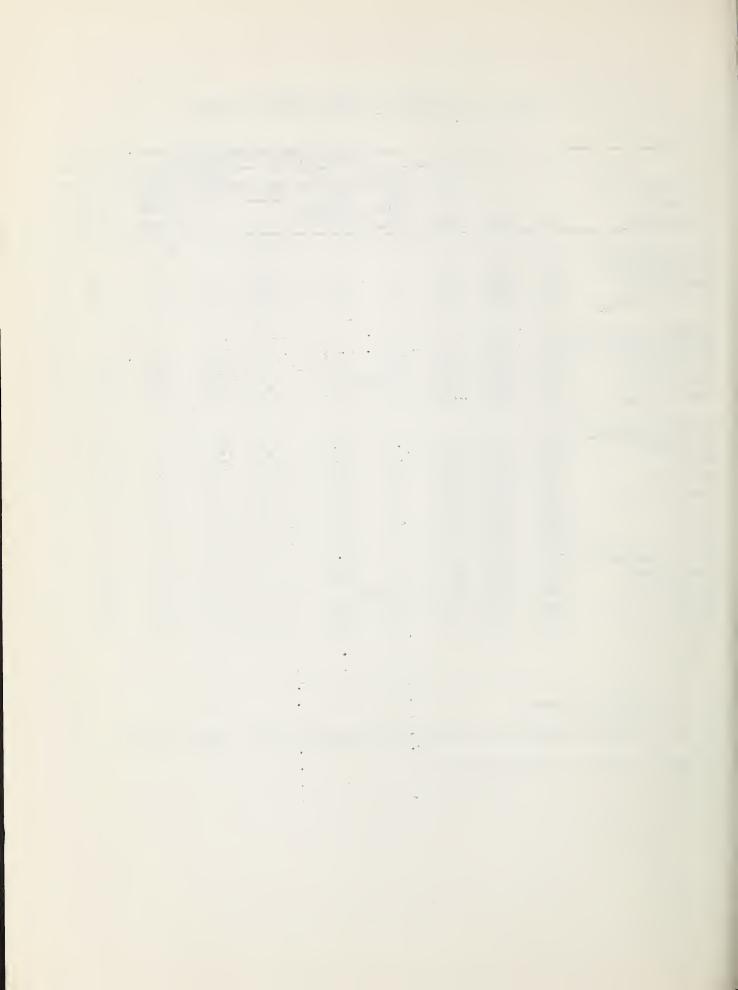
ARIZONA SNOW SURVEYS - ABOUT JANUARY 15, 1958

					ONOU GO	000 NO	A CITOCIA	DNMC	-
				1958	SNOW CO	VER ME		T RECORD	
DRAINAGE BASIN			Date		Water	Water		nt (In.)	Prior
and			of		Content			1938-52	Yrs. of
SNOW COURSE	No.	Elev.	Survey	(In.)	(In.)	1957	1956	Average	Record
WILLIAMS RIVER								2/	
Iron Springs	12R2	6200	1/14	0	0.0	0.0	0.0	1.3	12
Camp Wood 1	12R1	5700	1/15	0	0.0	0.0		1.1	11
Willow Ranch 3/	13P1	5000	1/14	0	0.0		0.0	1.7	10
LCWER COLORADO RI	VER								
Bright Angel	12N1	87100	1/14	15	3.6	2.7	2.1	7.0	10
Grand Canyon	11P1	7500	1/14	0	0.0	T	0.0	2.4	10
Fort Valley 3/ Chalender 1/	11P2 12P1	7350	Report	Delayed		0.0	0.0	2.9	11
OllaTelidel, T	TCLT	7100	7/ 7/1	0	0.0	0.0	0.0	3.4	11
LITTLE COLORADO R	IVER								
Ft. Apache	9R5	9160	1/12	13	2.7	2.8	3.4		7
Baldy	9S1	9125	1/12	11	2.2	2.7	T		7
Nutrioso	984	8500	1/15	3	0.9	0.0	0.0	1.9	18
Happy Jack 1/ Gentry	11R5 10R5	7630 7600	1/14	0	0.0	0.0	0.0		5
Heber	10R4	7600	1/12	0	0.0	0.0	0.0		6 6
Canyon Creek #2 3		7500	1/12	0	0.0		~		0
Mormon Mountain	11R3	7500	1/13	Ö	0.0	T	0.0		7
Mormon Lake	11R4	7350	1/13	Ö	0.0	Ī	0.0	4.0	11
Fort Valley 3/	11P2	7350	•	Delayed		0.0	0.0	2.9	11
McNary	9R2	7200	1/15	0	0.0	0.0	0.0	2.3	17
Forest Dale	10R6	6430	1/15	0	0.0	0.0	0.0	0.8	17

^{1/} On adjacent drainage.

^{2/} All 1938-52 averages are estimated from existing records within period.

^{3/} Not included in watershed averages.

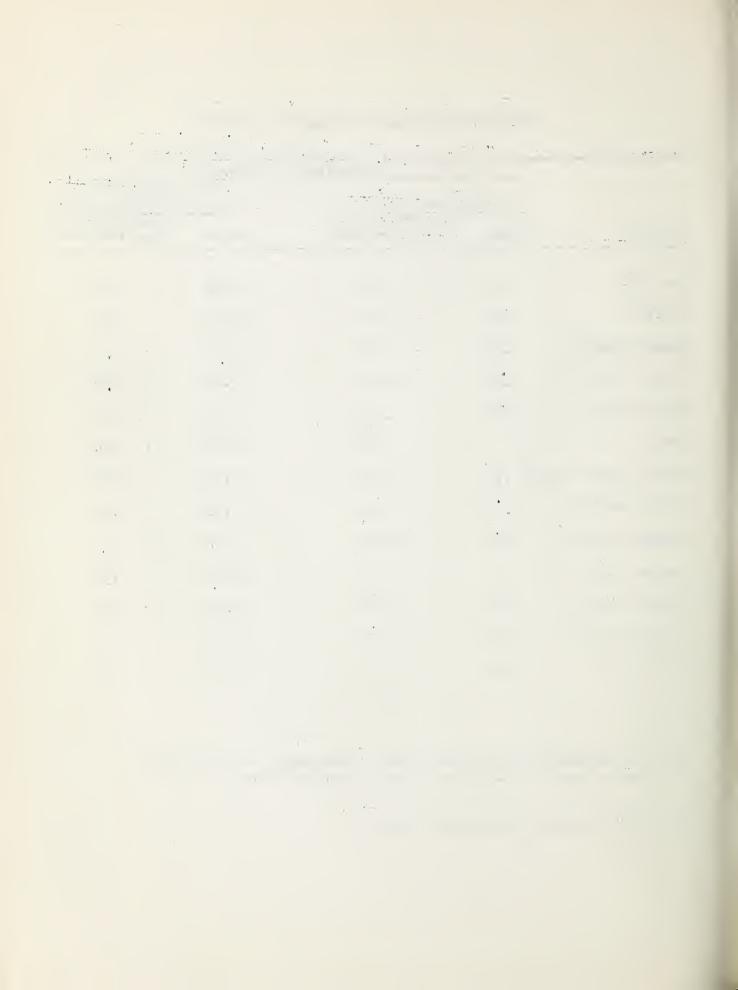


PRECIPITATION AT SELECTED ARIZONA STATIONS

		Precipitation	(Inches)	
				nt Water-Year
	Dec	ember - 1957	(Oct. 1	957 - Dec. 1957)
		Departure from		Departure from
STATION	Total	long term mean	Total	long term mean
Ash Fork	•34	- 493	3.05	+ •49
	• 2-4	•,,,	5005	•>
Clifton	•05	- 1.02	3.15	+ .87
Day all an Consider	0.0	10	7.00	. 20
Douglas Smelter	•23	48	1.90	+ .12
Flagstaff WBAS 2/	•59	- 1.27	8.49	+ 4.28
	• • • • • • • • • • • • • • • • • • • •		344)	4.00
Grand Canyon	1.06	45	7.38	+ 4.26
Parker	0	- •68	1.28	+ .14
Payson Ranger Stati	ion -74	- 1.26	7-35	+ 2.86
Phoenix WBAS 2/	00	71 .	0.01	+ 1-07
FIIOEILX WEAD	•23	74	2.91	+ 1.07
Prescott WBAS 2/	•28	- 1.08	2.77	+ .10
Springerville	Т	50	1,78	+ •20
phr miger arme	1	- •50	T* 10	20
Tucson WBAS 2/	. 89	05	4.07	+ 1.90
Winslow WBAS 2/	.01	- •52	2.72	+ 1.21
Yuma WBAS 2/	•05	- •50	2.73	+ 1.72
	• • •	• > -	-0.5	

Data and Analysis furnished by Paul C. Kangieser, Arizona State Climatologist, U. S. Weather Eureau, Phoenix, Arizona.

^{2/} WBAS = Weather Bureau Airport Station



LIST OF SNOW SURVEYORS

SNOW COURSE	SURVEYOR
Baldy	SCS and SRVWUA
Bear Wallow	Forest Service
Beaver Head	N. A. Josh
Black Canyon	Wayne Black
Bright Angel	National Park Service
Camp Wood	Mrs. C. C. Merritt
Canyon Creek	SCS and SRVWUA
Casner Park	SCS and SRVWUA
Chalender	Forest Service M. C. Oleson & F. E. Page
Coronado Trail	Forest Service J. D. McAdams
Forest Dale	Fort Apache Reservation - Valverde & Endfield
Frisco Divide	Forest Service
Ft. Apache	SCS and SRVWUA
Fort Valley	Rocky Mt. Forest & Range Experiment Station
Gaddes Canyon	SCS - Richard Enz
Gentry	SCS and SRVWUA
Grand Canyon	National Park Service _ J. Lynch
Happy Jack	Emil Ryberg
Heber	SCS and SRWUA
Inman	C. H. McCauley
Iron Springs	Ernest Saxby
McNary	Fort Apache Reservation - Valverde & Endfield
Maverick Fork	SCS and SRVWUA
Milk Ranch	Fort Apache Reservation - Valverde & Endfield
Mingus Mountain	SCS - Richard Enz
Mogollon	J. R. Wray
Mormon Lake	SCS and SRVWUA
Mormon Mountain	SCS and SRVWUA
Munds Park ,	SCS and SRVWUA
Nutrioso	Forest Service - J. D. McAdams
Pacheta	Foch Phillips
Rose Canyon	Forest Service
State Line	Forest Service
Taylor Creek	C. H. McCauley
Willow Ranch	Tiny Miller
Workman Creek	Rocky Mt. Forest & Range Experiment Station
MOTUMENT OF CER *****	moony mo. Poreso a mange experiment boatton

4 4 The following organizations cooperate in the Arizona snow survey work:

FEDERAL

Department of Agriculture

Soil Conservation Service

Forest Service
Apache Forest
Coconino Forest
Coronado Forest
Gila Forest
Kaibab Forest
Prescott Forest
Rocky Mountain Forest and Range Experiment Station

Department of Commerce Weather Bureau Arizona Section

Department of Interior

Bureau of Reclamation Region III

Geological Survey
Arizona District

Bureau of Indian Affairs Fort Apache Reservation

National Park Service Grand Canyon National Park

Gila Water Commissioner Safford, Arizona

IRRIGATION PROJECTS

Salt River Valley Water Users' Association Phoenix, Arizona

San Carlos Irrigation and Drainage District Coolidge, Arizona

PRIVATE

Southwest Lumber Mills, Inc.
McNary, Arizona

Other organizations and individuals furnish valuable information for the snow survey reports. Their cooperation is gratefully acknowledged.

Federal - State - Private COOPERATIVE SNOW SURVEYS

Furnishes the basic data necessary for forecasting water supply for irrigation, domestic and municipal water supply, hydro-electric power generation, navigation, mining and industry

"WATER IS THE WEST'S GREATEST RESOURCE"